

NON-PUBLIC?: N  
ACCESSION #: 8802100337  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Quad-Cities Nuclear Power Station, Unit 2 PAGE: 1 of 5

DOCKET NUMBER: 05000265

TITLE: Reactor Scram Due to Turbine/Generator Load Reject - Cause  
Undetermined  
EVENT DATE: 01/11/88 LER #: 88-001-00 REPORT DATE: 01/27/88

OPERATING MODE: 4 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: K. J. Hill, Technical Staff Engineer  
TELEPHONE #: 309-654-2241 Ext. 2150

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: EL COMPONENT: FU MANUFACTURER: G080  
REPORTABLE TO NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On January 11, 1988, Quad Cities Unit Two was in the RUN mode at 100 percent thermal power. At 1055 hours, a reactor scram occurred due to a turbine/generator load reject signal. This generator trip resulted from a ground detected by the generator 18 kV ground detection system. All safety feature actuations occurred as designed based on low reactor water level which resulted from the collapse of voids in the reactor core. A normal scram recovery followed. Two overvoltage relays were found tripped. NRC notification of this event was completed at 1120 hours to satisfy the requirements of 10 CFR 50.72.

The cause of this event was not determined. Station Electrical Maintenance and the Operational Analysis Department (OAD) performed extensive tests but no grounding problem was identified. The only problem identified was a blown fuse which could explain why one overvoltage relay was tripped, but could not have caused the other relay to trip.

Unit Two generator was put on-line at 0300 hours on January 16, 1988. No problems have been observed since that time. This report is provided to

comply with 10 CFR 50.73(a)(2)(iv).

(End of Abstract)

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#### PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor - 2511 MWt rated core thermal power. Energy Industry Identification System (EIIS) codes are identified in the text as (XX).

EVENT IDENTIFICATION: Unit Two Reactor Scram due to Turbine/Generator Load Reject with cause not determined.

#### A. CONDITIONS PRIOR TO EVENT:

Unit: Two Event Date: January 11, 1988 Event Time: 1055  
Reactor Mode: 4 Mode Name: RUN Power Level: 100%

This report was initiated by Deviation Report D-4-2-88-003

RUN Mode (4) - In this position the reactor system pressure is at or above 825 psig, and the reactor protection system is energized, with APRM protection and RBM interlocks in service (excluding the 15% high flux scram).

#### B. DESCRIPTION OF EVENT:

At 1055 hours on January 11, 1988, Quad Cities Unit Two was in the RUN mode at approximately 100 percent reactor thermal power. At this time a reactor scram (JC) occurred due to turbine (TA, TRB)/generator (EL, GEN) load mismatch. The turbine/generator load mismatch was caused by a generator trip which resulted when the Unit Two 345 kV oil circuit breakers (OCB's) (FK, BKR) automatically opened. The OCB's opened in response to a ground being detected by the generator's 18 kV ground detection system (TB). Buses 21 and 24 (EC, SSBUS), which are normally fed from the unit auxiliary transformer (EL, XFMR), transferred to the reserve auxiliary transformer (XFMR) which ensured power was available to all plant systems. The reactor water level transient caused by the collapse of voids in the core following the scram resulted in vessel level dropping below +8 inches. This caused Group 2 and 3 primary containment isolations (PCI) (JC), Reactor Building Ventilation (VA) and Control Room Ventilation (VI) isolations, and Standby Gas Treatment (BH) initiation. Reactor water level was immediately restored and a normal scram recovery followed. NRC

notification of the event via the Emergency Notification System (ENS) was completed at 1120 hours on January 11, 1988, to comply with the requirements of 10 CFR 50.72.

Following the reactor scram, Electrical Maintenance (EM) personnel and Operational Analysis Department (OAD) personnel were notified to investigate. EM personnel found the broken delta overvoltage relay (59) 59 G2-4/SV and the generator neutral ground transformer overvoltage relay (59) 59 G2 IAV to be tripped.

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Extensive testing was initiated to find the cause of the ground. This is documented in Quad Cities Onsite Review 88-02. The primary lead was removed on the neutral grounding transformer and Electrical Maintenance attempted to megger the entire 18kV system. The megger did not have the capacity to perform the test, so the generator links were removed, isolating the generator from the iso-phase bus (IPBU). The generator was then meggered at 2500V to 1.6 megohms. The iso-phase bus connected to Transformer (T) 21 and T2 was also meggered twice on different shifts at 2500V for a value of 8.5 megohms. The transformer links were removed, isolating T21 and T2 from the iso-phase bus and the following three components were remeggered at 2500V: 1) The iso-phase meggered to 7000 megohms, 2) T21 to 50,000 megohms, and 3) T2 to 2500 megohms. The iso-phase bus was high potential tested to 41kV and found acceptable.

Gas and oil samples were taken by OAD and were analyzed to detect a possible fault in either transformer. The test proved negative. The generator was purged and both high voltage lead box covers removed for inspection. The south lead box had evidence of oil with a small amount of water, but the bushings were clean of oil and water. The north lead box had a small amount of oil on the floor with no water present. Both lead boxes were cleaned, insulators wiped down and the bushing visca seals in the north box replaced. There was no evidence of what caused the ground.

he only abnormal inspection finding was a blown pot fuse (FU) on A phase primary side. All generator potential (pot) transformers were meggered at 2500V, ratio tested and the primaries were backfed to rated 10,800 volts. All pot transformers appeared fine and no visual sign of a fault was detected. The secondary fuses were tested satisfactorily and no grounds were detected on the secondary side of the potential transformer. The potential transformer capacitors (CAP) and lightning arrestors (LAR) were then meggered separately. The capacitor test results were 180 megohms at 2500V and the arrestor

test results were 20,000 megohms. T21 and T2 bushings were inspected and the links to the iso-phase reinstalled. With all three components tied together, an additional megger at 2500V was taken to compare with the original megger reading of 8.5 megohms. With pot capacitors not in the circuit, the iso-phase and both transformers meggered at 1250 megohms to 2500 megohms fluctuating at 2500V. With the capacitors in the circuit, a value of 62.5 megohms was obtained. The cause for the improvement over the original value of 8.5 megohms is unknown.

Station personnel crawled through the large portion of the iso-phase bus duct and cleaned the insulators. They were not able to fit through the small duct portion to T21. Although there were a few missing bolts in one insulator, and some dust was present, no sign of a ground was observed. With the iso-phase connected to both transformers, OAD backfed the transformers at 480V to look for a possible phase imbalance. A phase current measured at .67 amps, B phase at .475 amps and C phase at .8 amps. These test results were acceptable and no further testing on the iso-phase bus duct or transformers was performed.

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At this time OAD recommended that a D.C. megger to 7.5 kV be performed on the generator. OAD performed the test on both the north and south set of windings and obtained results consistent with the original 1.6 megohms value. After a meeting with Station Management, General Electric, Nuclear Operations, and OAD, it was decided to high potential test the Main Generator to 24 kV A.C. at 60 HZ. No unusual results were obtained from this test.

Station Management notified the Institute of Nuclear Power Operations (INPO) of the situation and asked if any advice could be given. INPO responded with a list of potential transformer fuse failures that the Station reviewed for applicability. None of the failures seemed to apply at Quad Cities for this particular trip. INPO also recommended a generator authority from Georgia Power who was contacted by the Technical Staff and OAD personnel at the station. It was recommended that the secondary side of the main generator potential transformer be checked for grounds to try to explain the blown pot fuse. This test was performed with negative results. Based on additional INPO Nuclear Network information, Operations and Electrical Maintenance visually checked the stator cooling water (TJ) flexible lines at the Alterex (TL) for possible leaks. No leaks were detected.

After reviewing the test results based on Onsite Review 88-02, the onsite review personnel decided to commence unit startup and bring the

Unit Two generator back on line. At 0900 hours on January 15, 1988, Unit Two commenced reactor startup. At 0300 hours on January 16, 1988, with personnel from Electrical Maintenance, OAD, General Electric, the Assistant Superintendent of Operating and the Services Superintendent in attendance, the Unit Two generator was put on-line. No problems were detected and normal startup continued to full reactor power.

#### C. APPARENT CAUSE OF EVENT:

This event is being reported according to 10 CFR 50.73(a)(2)(iv), which requires the reporting of any event or condition that results in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS). The cause of this event was not determined. Testing of the main transformer and generator did not reveal any grounding problem. The blown fuse which was discovered could explain why the broken delta overvoltage relay tripped but does not explain why the generator neutral ground transformer overvoltage relay tripped. Also, it is not known at what time the fuse failed. The fuse could have failed as a result of the generator trip or during the course of testing after the scram.

#### D. SAFETY ANALYSIS OF EVENT:

The safety of the plant and public was not affected during this event. The Reactor Protection System (RPS) responded as designed to scram the reactor and bring it to a safe shutdown condition. The main generator protective instrumentation is designed to prevent extensive damage to the main generator or transformer resulting from a fault. A trip of either the broken delta overvoltage relay or the generator neutral ground transformer overvoltage relay alone would have caused the generator trip. In this event, both protective relays responded to the ground signal, either real or false, to shutdown the main generator and prevent damage to equipment.

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#### E. CORRECTIVE ACTIONS:

In addition to the extensive testing outlined in section B, a digital fault recorder was connected to the main generator prior to unit startup to monitor and record the following parameters for a five second time period following any deviation in the parameter limits established by OAD:

- Parameters 1) Metering Potential A phase
- 2) Metering Potential B phase

- 3) Metering Potential C phase
- 4) Regulator Potential A phase
- 5) Regulator Potential B phase
- 6) Regulator Potential C phase
- 7) Generator Ground Resistor
- 8) Broken Delta Potential
- 9) Lockout Relay 86G2 start
- 10) Lockout Relay 86G2B start

As of the date of this report, no problems have occurred with the main generator.

#### F. PREVIOUS EVENTS:

There has been no previous event of an unexplained generator trip at Quad Cities station.

#### G. COMPONENT FAILURE DATA:

The fuse which was discovered to have failed was manufactured by General Electric, type EJ-1-Y-1 size C.

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Commonwealth Edison  
Quad Cities Nuclear Power Station  
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Cordova, Illinois 61242  
Telephone 309/654-2241

RLB-88-26

January 26, 1988

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

Reference: Quad-Cities Nuclear Power Station  
Docket Number 50-265, DPR-30, Unit Two

Enclosed please find Licensee Event Report (LER) 88-001, Revision 00, for Quad-Cities Nuclear Power Station.

This report is submitted in accordance with the requirements of the Code of Federal Regulations, Title 10, Part 50.73(a)(2)(iv), which requires

the reporting of any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature, including the Reactor Protection System.

Respectfully,  
COMMONWEALTH EDISON COMPANY  
QUAD-CITIES NUCLEAR POWER  
STATION  
/s/ R. L. Bax  
R. L. Bax  
Station Manager

RLB/MSK/dak  
Enclosure  
cc: I. Johnson  
R. Higgins  
INPO Records Center  
NRC Region III

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